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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,100	12/03/2001	Robert A. Shepherd JR.	NOVEP015	9461

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EXAMINER	
ZERVIGON, RUDY	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 02/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/006,100	SHEPHERD ET AL.
	Examiner	Art Unit
	Rudy Zervigon	1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 31, 2003 has been entered.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi et al (USPat. 5,217,559) in view of Alan Notman (USPat. 4,311,671). Moslehi teaches an apparatus (Figures 1,3,4) for managing plasma (column 5, lines 15-37) in wafer processing operations (column 2, lines 60-68) comprising:

i. A housing (126; Figure 3) having an fluid entry port (122) and a fluid exit port (152), the housing having an internal region (124, 162, 154) defined by a top horizontal wall (126/122 interface), a bottom horizontal wall (144) and a circular side wall (142)

ii. Three circular ("annular pumping space"; column 9, lines 55-63), horizontally placed, baffle plates (134, 132, 130; Figure 3), each of the baffle plates define a level in a multilevel structure formed in the internal region within the housing (Figure 3), each baffle plate being separated from one another and separated from both the top horizontal wall and the bottom

horizontal wall by a separation spacing (Figure 3), each of the plurality of baffle plates including:

a. A plurality of holes (168), the plurality of holes in each of the baffle plates being oriented so that holes defined in each of the plurality of baffle plates are aligned thus defining a linear path for fluids designed to enter the entry port (Figure 3), traverse each level of the multilevel structure defined by the plurality of baffle plates, the fluids capable of mixing together at each level of the multilevel structure (Figure 4; column 10, lines 17-41), and leave the exit port of the housing - Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02). Moslehi clearly teaches mixing in regions 152 and 154 of Figure 4. Mixing in region 162 clearly depends on the regional pressure differences between regions 154 and 124 (plasma), Figure 4.

b. A gas inlet port / fluid input (156, Figure 3) in at least one of the separating spacing (154), the gas inlet port configured to inject gas (160) into the housing in at least one of the separating spacing (154)

iii. A housing (126, Figure 3) configured to have a first chamber (154) and a second chamber (162), the first and second chamber being separated by a wall (132) having a plurality of orifices (conduits, not labeled) the housing having an input / input port (122) at a first end for supplying a plasma (column 10, lines 17-41) into the first chamber and an output port (152) at a second end of the housing, the input port and the output port being aligned with each other and aligned with each of the plurality of orifices

iv. The plasma supplied through the input port capable of mixing with the supplied fluid within the second chamber (154; column 10, lines 17-41) – this is inherent due to the variable flow rates permitted by Moslehi ("gas flow controller (not shown)"; column 6, lines 5-9)

v. The gas inlet port (156, Figure 3) is in an uppermost separation spacing (154)

vi. A gas port (164, Figure 3) is in a lowermost separation spacing (162)

vii. The gas injected from the gas inlet port mixes with the plasma in the separation spacing (column 10, lines 17-41)

viii. A fluid conduit (164) is provided in the second chamber

Moslehi then does not teach the plurality of holes are misaligned defining a nonlinear path for fluids. Moslehi does not teach that the posterior gas mixing undergoes turbulent mixing.

Alan Notman teaches a synthesis reactor (Figure 5) including baffles plates (16b', 16b'', 49') each with plurality of holes (52, 36 for 16b'; 53, 36 for 16b''; 54, 36 for 49') are misaligned defining a nonlinear path for fluid flow.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to shift (move) one or more of Moslehi's baffle plates horizontally such that each of the plurality

of holes are misaligned defining a nonlinear path for fluid flow as taught by Alan Notman and to alter the flow rates of the injected gases to increase turbulent mixing.

Motivation to shift (move) one or more of Moslehi's baffle plates horizontally such that each of the plurality of holes are misaligned defining a nonlinear path for fluid flow as taught by Alan Notman is to provide for a nonlinear flow through the reactor.

Motivation to alter the flow rates of Moslehi's injected gases to increase turbulent mixing is to optimize the mixing of the plasma and nonplasma gases. Further, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

4. Claims 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi et al (USPat. 5,217,559) in view of James W. Rudolph (USPat. 5,480,678). Moslehi teaches an apparatus for managing plasma (column 12; lines 46-68; Figure 3,4) in wafer processing operations (Figure 1) comprising:

i. a housing (both sides; 165, Figure 4) configured to have an internal region (152+154+162+124, Figure 4) that is defined by an inner wall (not labelled, extent of volume 165, Figure 4), the housing (both sides; 165, Figure 4) having an input port (122, Figure 4; column 12; lines 46-68) for supplying a plasma into the housing (both sides; 165, Figure 4) at a first end (nearest 122 designation, Figure 4; column 12; lines 46-68) and an output port (farthest 122 designation, Figure 4; column 12; lines 46-68) at a second end;

ii. a hollow tube (122, Figure 4; column 12; lines 46-68), the hollow tube (122, Figure 4; column 12; lines 46-68) being contained in the internal region (152+154+162+124, Figure 4) within the housing (both sides; 165, Figure 4), the hollow tube (122, Figure 4; column 12; lines 46-68) having a top and a bottom, the top connected to the first end (nearest 122 designation, Figure 4; column 12; lines 46-68); and

iii. a fluid input (156, Figure 4; column 12; lines 46-68), the fluid input (156, Figure 4; column 12; lines 46-68) being configured to supply fluid into the internal region (152+154+162+124, Figure 4) of the housing (both sides; 165, Figure 4), the plasma supplied through the input port (122, Figure 4; column 12; lines 46-68) capable of being mixed within the hollow tube (122, Figure 4; column 12; lines 46-68) with the supplied fluid that enters the hollow tube (122, Figure 4; column 12; lines 46-68) through the plurality of orifices;

iv. wherein the output port (farthest 122 designation, Figure 4; column 12; lines 46-68) at the second end of the housing (both sides; 165, Figure 4) enables the mixed plasma and fluid supply to exit the housing (both sides; 165, Figure 4), as claimed by claim 18

v. An apparatus for managing plasma in wafer processing operations as recited in claim 18, further comprising: a plasma generating source (18, 22; Figure 1) connected to the input port (122, Figure 4; column 12; lines 46-68), the plasma generating source (18, 22; Figure 1) configured to produce the plasma, as claimed by claim 19

vi. An apparatus for managing plasma in wafer processing operations as recited in claim 18, further comprising: a wafer processing chamber (30; Figure 1) connected to the output port (farthest 122 designation, Figure 4; column 12; lines 46-68), the wafer processing chamber

(30; Figure 1) being configured to receive the mixed plasma from the output, as claimed by claim 20

vii. An apparatus for managing plasma in wafer processing operations as recited in claim 18, wherein turbulence is created inside the hollow tube (122, Figure 4; column 12; lines 46-68) through receipt of the supplied fluid – that turbulent or laminar flow is "created" in pipe 122 is specifically dependent on the geometry of the pipe, velocity of flow, and density of the supplied gas as per the well known Reynold's number relationship[1]:

$$R_e = \frac{\rho V D}{\mu}_{PipeFlow}$$

As a result, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

i. An apparatus for managing plasma in wafer processing operations as recited in claim 21, wherein the turbulence ensures mixing of the supplied fluid and the plasma, as claimed by claim 22

ii. An apparatus for managing plasma in wafer processing operations ms recited in claim 18, wherein the plasma is a downstream plasma, as claimed by claim 23

[1] The Handbook of Fluid Dynamics – "Basic Engineering Fluid Mechanics", p.5-62, Foss et al; 1998 CRC Press

Moslehi does not teach that his hollow tube (122, Figure 4; column 12; lines 46-68) has a bottom connected to the second end and further being defined by a wall that extends between the first end (nearest 122 designation, Figure 4; column 12; lines 46-68) and the second end, the hollow tube (122, Figure 4; column 12; lines 46-68) containing a plurality of orifices that define a plurality of fluid paths through the wall.

James W. Rudolph teaches a similar gas dispersion plates (104, Figure 6) that are also staggered. James W. Rudolph further teaches a hollow tube (122, Figure 4; column 12; lines 46-68) conduit (17, Figure 6) that is perforated.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Moslehi's plasma delivery conduit (122; Figure 4) with Rudolph's perforated hollow tube (122, Figure 4; column 12; lines 46-68) conduit (17, Figure 6) such that Moslehi's plasma delivery conduit extends to an output (180) of the housing (both sides; 165, Figure 4).

Motivation to replace Moslehi's plasma delivery conduit (122; Figure 4) with Rudolph's perforated hollow tube (122, Figure 4; column 12; lines 46-68) conduit (17, Figure 6) such that Moslehi's plasma delivery conduit extends to an output (180) of the housing (both sides; 165, Figure 4) is to provide for gas dispersion as taught by Rudolph (column 9, lines 53-65).

Response to Arguments

5. Applicant's arguments filed December 31, 2003 have been fully considered but they are not persuasive.

6. In response to applicant's argument that Notman is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be

reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the Notman reference is reasonably pertinent to the particular problem with which the applicant was concerned – gas dispersion and mixing in reactors.

7. The remainder of Applicant's arguments address the newly amended claims. Applicant is directed to the body of the new claim rejections above for these newly added limitations.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (571) 272-1439.